REMARKS

In the previous Office Actions, the Examiner did not indicate whether the formal drawings previously filed were acceptable. Please indicate whether the formal drawings are accepted.

Claims 1-15 are pending in the application. Claims 16-34 are withdrawn from consideration. Claims 1-15 are rejected. In the current Office Action of November 10, 2005, the Examiner again rejected claims 1-6, 8-11, and 13-15 pursuant to 35 U.S.C. §103(a) as being unpatentable over Scheib et al. (U.S. Patent No. 5,682,896) in view of Schimpf et al. (U.S. Patent No. 6,784,894). Claims 7 and 12 were rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Scheib et al. in view of Schimpf et al. and further in view of Pan et al. (U.S. Patent No. 6,464,641).

Claims 1 and 10 have been amended. Claims 7, 12, and 16-34 have been cancelled.

Applicants respectfully request reconsideration of the rejections of claims 1-6, 8-11, and 13-15, including independent claims 1 and 10.

Independent claim 1 has been amended to include the limitations of dependent claim 7. Independent claim 1 recites a graphics processing unit operable to process ultrasound data and with at least one output connected with a processor operable to process ultrasound data output by the graphics processing unit wherein the graphics processing unit implements at least a part of a first ultrasound process selected from the group of: receive beamformation, scan conversion, motion detection and combinations thereof and the processor implements at least a part of a second ultrasound process selected from the group of: detection, motion tracking, filtering, scan conversion, and combinations thereof.

Applicants previously argued that if a person of ordinary skill in the art had used the graphics system of Schimpf et al. for the graphics processor of Scheib et al, the video processor of Scheib et al. would have been included in the graphics system and not as a separate component. The use of disclosures alleged by the Examiner would have resulted in no further processor connected with an output of the graphics processing unit to process output ultrasound data as recited by claim 1. In response, the Examiner noted that "it is the hardware accelerator 18 of the graphics system 112 of Schimpf et al. in place of the graphics processor 105 of Scheib et al."

The graphics processor 105 of Scheib et al. outputs data to a video processor 127. By replacing the graphics processor 105 with the hardware accelerator 18 of Schimpf et al., the

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hardware accelerator 18 would output to the video processor 127. The video processor 127 generates black and white ultrasound information on a video display 130 (col. 2, lines 60-67). The information may be transmitted in NTSC format for storage on a tape. Applicants respectfully submit that there is no suggestion of performing detection, motion tracking, filtering, scan conversion or other ultrasound process by the video processor 127. Thus Scheib et al. and Schimpf et al. do not disclose a processor, connected with an output of the graphics processing unit that performs detection, motion tracking, filtering or scan conversion.

Similarly, the graphics processor 105 of Scheib et al., even using the hardware accelerator 18 of Schimpf et al., is not disclosed as implementing receive beamformation, scan conversion or motion detection. The RF processor 103 outputs I/Q information (col. 2, lines 53-58), implying receive beamformation being provided by the RF processor 103. The Doppler processor 106 performs motion detection (col. 2, lines 55-58; and col. 3, lines 20-53). The only scan conversion is noted as a separate color scan converter 108 (col. 3, lines 1-12). Scheib et al. with the hardware accelerator teaching of Schimpf et al. provide separate components for implementing receive beamformation, motion detection and scan conversion, and thus do not suggest the hardware accelerator implementation of any of the claimed ultrasound processes (receive beamformation, motion detection or scan conversion).

Pan et al. is relied on to show the ultrasound path beginning at the beamformer. Both Scheib et al. and Pan et al. use separate components for the various ultrasound processing components. The separate components for Scheib et al. are discussed above. Pan et al. includes a beamformer 4, a color flow processor 6, and a scan converter 12 (see Figure 1). In Pan et al., the graphics processor generates graphics symbols (col. 5, lines 55-59). The video processor maps data to display data and combines information (col. 5, lines 6-12, 27-31 and 50-55). There is no suggestion to use the video processor or a graphics processing unit for any of the claimed functions. Pan et al. and Scheib et al. use a video processor for video processes and different components for ultrasound processes. Pan et al., Scheib et al., and Schimpf et al. do not disclose the graphics processing unit implementing at least a part of a first ultrasound process selected from the group of: receive beamformation, scan conversion, motion detection and combinations thereof and the processor connected with an output of the graphics processing unit implementing at least a part of a second ultrasound process selected from the group of: detection, motion tracking, filtering, scan conversion, and combinations thereof.

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Independent claim 10 has been amended to include the limitations of claim 12. Claim 10 recites processing ultrasound data with a processor of a graphics processing unit, processing the ultrasound data output from the graphics processing unit with a different processor connected to the graphics processing unit prior to generating a display and generating a display wherein processing first ultrasound data comprises performing at least a part of a first ultrasound process selected from the group of: receive beamformation, scan conversion, motion detection and combinations thereof and wherein processing second ultrasound data comprises performing at least a part of a second ultrasound process selected from the group of: detection, motion tracking, filtering, scan conversion, and combinations thereof. Applicants respectfully submit that there is no suggestion to receive beamform, scan convert and/or motion detect with a graphics processing unit (GPU) and then further detect, motion track, filter, and/or scan convert the output from the GPU.

Dependent claims 2-6, 8-9, 11, and 13-15 depend from the independent claims 1 and 10 discussed above, and are thus allowable for at least the same reasons. The dependent claims are allowable for other reasons as well. For example, claim 3 recites an output upstream from the fragment processor where the output is for the GPU and connects with a processor. The Examiner does not cite to a showing by Schimpf et al. of the claimed output of the GPU. Schimpf et al. show connections internal to the graphics system. Scheib et al. also do not provide the claimed output. As another example, claim 5 claims two outputs of the GPU, one to a processor and one to a display. Scheib et al. suggest connection to the display, not another processor. There is no suggestion to use two outputs. As yet another example, claim 8 and 13 recite the vertex processor operable to perform a scan conversion operation. Schimpf et al. show that the vertex processor receives vertices on screen space coordinates (col. 10, lines 28-32). There is no disclosure of using the vertex processor to reformat data from one coordinate system to another. In another example, claims 9 and 15 recite the fragment processor operable to perform a Fourier transform or a non-linear scan conversion operation. The Examiner alleges that these operations are well known and used in graphics arts. However, these processes are not usual processes done by a fragment processor. These are image processes in ultrasound typically performed by ASICs or DSPs. Thus, it would not have been obvious to perform these processes with a fragment processor. As yet

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another example, there is no suggestion for the fragment processor to be operable to scan convert as claimed in claim 14.

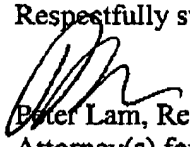
CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 943-7350 or Craig Summerfield at (312) 321-4726.

PLEASE MAIL CORRESPONDENCE TO:

Siemens Corporation
Customer No. 28524
Attn: Elsa Keller, Legal Administrator
170 Wood Avenue South
Iselin, NJ 08830

Respectfully submitted,



Peter Lam, Reg. No. 44,855
Attorney(s) for Applicant(s)
Telephone: 650-943-7350
Date: 1/10/06

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